

Washington State Department of
Labor & Industries

Electrical Plan Review Submittal Guide

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Introduction

Although electrical plans are checked for compliance with many sections of the National Electrical Code, the main focus of our review is the load on the service and feeders of the electrical system(s), and proper design of emergency and standby systems. Our review starts at the branch circuit level and investigates equipment and conductors in the load path back to the service point.

The pages following this introduction describe the information needed to review your electrical plans and load data. We have included hyperlinks, instructions, sample forms, and schedules to demonstrate an acceptable format that can be used to present your supporting documentation. You may use our forms, or you may create your own. These forms are designed to assist you in assembling an accurate presentation that demonstrates your design is in compliance with the appropriate codes.

The ***"Electrical Plan Review Submittal"*** form **must be completed and enclosed** with all plan submittals. The information in items 1 through 11 on this form is entered into our database and provides us the details needed to identify, track, and record your project. **Plans sent in without a submittal form may be rejected upon receipt.** Here is the Electrical Plan Review [Submittal Form](#).

The documentation as outlined in the ***"Electrical Plan Review Screen-In Checklist"*** **must be** presented in order for the plans examiner to begin a review. **Plans lacking the appropriate screen-in information or "identified" as something other than construction documents, may be disapproved and sent back.** Here is the Electrical Plan Review [Screen-In Checklist](#).

The Electrical Plan Review staff would like to hear any suggestions or concerns you may have about the review process. We welcome your constructive comments.

RCW and WAC Requirements for Electrical Plan Review

Revised Code of Washington (RCW) 19.28 states that electrical installations “*shall be in conformity with approved methods of construction.*” The standards used for “*approved methods*” are listed in Washington Administrative Code (WAC) 296-46B-010 and include the currently adopted editions of NFPA 70 (National Electrical Code).

WAC 296-46B-900 (1) provides classification or definition of occupancies. WAC 296-46B-900 (3) Table 900-1, and Table 900-2 specify the occupancies for which plan review is required.

WAC 296-46B-900 (2) states “Plan review is a part of the electrical inspection process; its primary purpose is to determine: (a) That service/feeder conductors are calculated and sized according to the proper NEC or WAC article or section; (b) The classification of hazardous locations; and (c) The proper design of emergency and standby systems.” The Electrical Plans Examiner’s responsibility is to review plans for electrical installations to verify compliance with the National Electrical Code and Washington State Rules and Regulations.

WAC 296-46B-900 (3)(h) requires that plans that are to be reviewed by the department “... *must clearly show the electrical installation or alteration in floor plan view, include all switchboard and/or panelboard schedules and when a service or feeder is to be installed or altered, must include a riser diagram, load calculation, fault current calculation and interrupting rating of equipment. Where existing electrical systems are to supply additional loads, the plans must include documentation that proves adequate capacity and ratings. The plans must be submitted with a plan review submittal form available from the department...*”

Riser diagrams and load calculations must include all of the equipment carrying the additional loads and be complete to the point of connection between the facilities of the serving utility and the premises wiring. NEC 215.5 requires that the details of such diagrams and calculations shall include “...*the total calculated load before applying demand factors, the demand factors used, the calculated load after applying demand factors, and the size and type of conductors to be used.*”

For the latest Electrical RCW and WAC rules please visit our web site at:
<https://lni.wa.gov/licensing-permits/electrical/laws-rules-policies>

Electrical Plan Review Staff Phone Numbers and Mailing Address

Please direct all billing calls and plan status checks to the EPR Supervisor.
The plan review supervisor will address technical or plan review policy questions.

Chief Electrical Inspector:

Phone Number: 360.902.5249

Electrical Plan Review Supervisor:

Phone number: 360.902.5254

Electrical Plan Review General Information:

Phone Number: 360.902.5246

Electrical Plans Examiners:

Phone Number: 360.902.4920

Phone number: 360.902.5248

Phone Number: 360.902.5631

Phone number: 360.902.6483

Phone Number: 360.902.5247

PS2 Phone Number: 360.902.6778

Mailing Addresses

Please address all mail to: Electrical Plan Review
Attn: EPR Supervisor

Street / Delivery Address: 7273 Linderson Way SW
Tumwater, WA 98502

Mailing Address: PO Box 44460
Olympia, WA 98504-4460

Email: ElectricalPlanReviewMailQuestions@Lni.wa.gov

Electrical Plan Review Fees

A basic submittal and handling fee of \$125.00 shall be paid to initiate a review. Plan review fees are based upon 35% of the electrical inspection permit fee, from the current adopted Washington Administrative Code (WAC 296-46B). The fees are verified and calculated during the review process, plus the basic submittal, and handling fee, and any additional hours that were necessary in the review process. Plan review fees are completely separate from electrical permit fees. Any plan review fees that remain unpaid, once the review is completed, will be billed. **Billed fees are due and payable 15 days after billing.**

Electronic Plan Review

To submit electronic plans to the department, the applicant must submit the following:

- A completed [Submittal Form](#)
- A completed, dated and signed [Screen-In Checklist](#)
- Payment of \$125.00 to the Electrical Plan Review by mail directly to Electrical Plan Review or in person at a service location near you. This payment will begin the review process and you will be billed the balance due upon completion of the electrical plan review.
- Electrical Plan Review will then process the submittal into the review queue and the submitter will be invited to send in a PDF version of the plans.

Plan Review in Cities Doing Their Own Electrical Inspections?

If the project you are submitting is within the inspection jurisdiction of the cities listed using the hyperlink below, Labor and Industries **does not** do the plan review. You will have to submit your plans to the city responsible for the electrical inspection.

<http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermlInsp/CityInspectors/default.asp>

Plans Examiner Geographical Areas?

Electrical Plans are not assigned based upon a geographic area.

To find a service location near you, visit www.lni.wa.gov or use the link below

[Labor and Industries Service Locations](#)

Electrical Plan Review - Checklist Instruction Sheet

Professional Engineers stamp and signature

Professional Engineers stamp and signature shall be on all plan sheets for the following types of facilities; Educational, Hospitals, Nursing Homes, and other medical facilities that require review by the Department of Health.

Plan Sheet requirements

Shall include all the following:

- Minimum scale 1/8" (except site plan)
- Minimum font size "9"
- Symbol legends
- Circuit connecting lines with home runs shown for all equipment, lighting, receptacle symbols; or other methods by permission.
- Schedules with electrical specifications for Luminaires, Mechanical/Equipment, Kitchen, Shop, and all other equipment items listed on the switchboard and panel schedules.
- Show the location of all items on the One-Line/Riser diagrams.
- Plan sheets need to reflect current as-built conditions.
- Plan sheets "specifically" identified as something other than the "Construction Set", cannot be approved.

One-line/Riser Diagrams

Shall be complete and include the following:

- Service point (NEC 100 Definitions)
- Conductor size, type, and number of
- Equipment grounding conductor size, type, and number of, or identify if metallic raceway
- Conduit sizes, type, and number of
- Identifier's for distribution equipment such as switchboards, panelboards, transformers, etc.
- Overcurrent protection devices
- System (Voltage, phase, wire.)
- Bus ratings (the true value)
- AIC ratings
- Transformer primary/secondary voltages, KVA size, and source marking.
- Clearly indicate if system is fully rated or series rated for the available fault current.
- Locations with fault calculation values greater than 10,000 AIC need to be identified
- Additional items that maybe required shall be indicated. Such as; **Ground Fault Protection**, 2nd Level Ground Fault Protection, etc.

Fault Current Calculations

The one line/riser diagram shall show the AIC value at all locations that are equal to or greater than 10,000 ampere. Fault calculations are required for new installations or existing installations when requested by Plan Review.

Electrical Plan Review - Checklist Instruction Sheet Cont...

Panel Schedules

Panel schedules for switchboards, distributions, and panels must be provided on the plan sheets and one set of panel schedules on 8½" × 11" sheets for use during the review process. The following information is required to be shown on the panel schedule.

- System voltage, phase, wire, bus rating, bus available interrupting current rating.
- Overcurrent protection device size with available interrupting current rating, circuit number, phase identification, total phase load.
- Load values in VA or KVA. If using KVA the value needs to be expressed out to two decimal places. (Example: 1237 VA = 1.24 KVA)
- Each circuit shall indicate the type of load category.
- Load summary by type of category provided at the bottom of the panel schedule with the connected and calculated load values and NEC demand factor(s) shown.
- Single panels and Multi-section panels shall indicate Main breaker size or lug configuration; Main lug only, Double lugs, Feed thru lugs.
- A separate panel schedule and calculation which includes downstream loads is required for each section of a Multi-section panel design.
- A "Before and After" panel schedule presentation, must be located side by side on the same plan sheet.

Generator or Alternate Power System

- Where Generator unit(s) or alternate power system(s) are existing, or going to be installed, the locations are required to be provided on the plan sheets and clearly identified.
- Identification of generator or alternate power system **type** is required, such as...
- NEC-517 *Essential Electrical System,
- NEC-700 *Emergency System,
- NEC-701 Legally Required Standby System,
- NEC-702 Optional Standby System,
- NEC-705 Interconnected Electrical Power Production Sources,
- NEC-708 Critical Operations Power Systems (COPS).
- NEC-517, NEC-700, NEC-701 System Generator's. All the generator accessory loads shall be connected to the same system the generator supply's to maintain the integrity of the system. (Examples; battery chargers, block heaters, fuel pumps, dampers, equipment lighting)

***Only NEC-517 Essential Electrical System(s) and NEC-700 Emergency System(s) can supply Emergency load(s).**

Electrical Plan Review - Checklist Instruction Sheet Cont...

Documentation on System Coordination

The documentation needs to clearly indicate that the Professional Engineer takes full responsibility that the installation, when installed as designed, shall comply with the requirements of NEC-700.28 Selective Coordination for Emergency System, **or** NEC-701.27 Selective Coordination for Legally Required Standby System, **or** NEC-517.26 Selective Coordination of Life Safety Branch of the Essential Electrical System, **and** Coordination of the Critical Branch, Equipment Branch of the Essential Electrical System. Provide documentation on plan sheet(s) or the professional engineer's company letterhead. Statement needs to include Professional Engineer's stamp and signature whether on plan sheet or company letterhead.

Metered Demand Data

Metered demand data shall include the following:

- Copy of the current last 12 months of utility demand.
- Complete Calculations for all metered data shall be in KVA.
- Use of utility KW demand shall be converted to KVA using an appropriate power factor adjustment.
- Metered load studies shall include a minimum of 30 days continuously recorded.
- Provide the ampere value of each phase at the beginning of the study.
- The current transformer (CT) shall be connected to the highest ampere phase at the beginning of the study when all phase conductors are not being recorded.
- Where multiple load studies are conducted at different locations on the distribution system the recording of all phases at that metered location will be required.
- The one-line diagram shall indicate the metered point location for each load study. The following information is also required.
- Graph of the study with time periods, ampere values, and ampere maximum peak clearly identified.
- Make/model of recording equipment, make/model of current transformer's.
- Where equipment is not or cannot be set to record a 15 minute demand mode (average value over a 15-minute period continuously recorded), contact plan review concerning acceptability of your alternate recording method before starting load study.
- Calculations provided shall be based on the ampere maximum peak value shown on the graph.
- Existing loads included in metered load data and removed or altered shall not be subtracted from the demand data or demand calculation.

Electrical Plan Review - Checklist Instruction Sheet Cont...

Medium or High voltage Systems (over 1000v)

Shall be complete and include the following:

- Service point
- Conductor size, type, and number of
- Equipment conductor size, type and number of
- Conduit sizes
- Overcurrent protection devices
- System (Voltage, phase, wire.)
- Bus ratings
- AIC ratings
- Transformer primary/secondary voltages and KVA size
- Locations with fault calculation values greater than 10,000 AIC need to be identified.

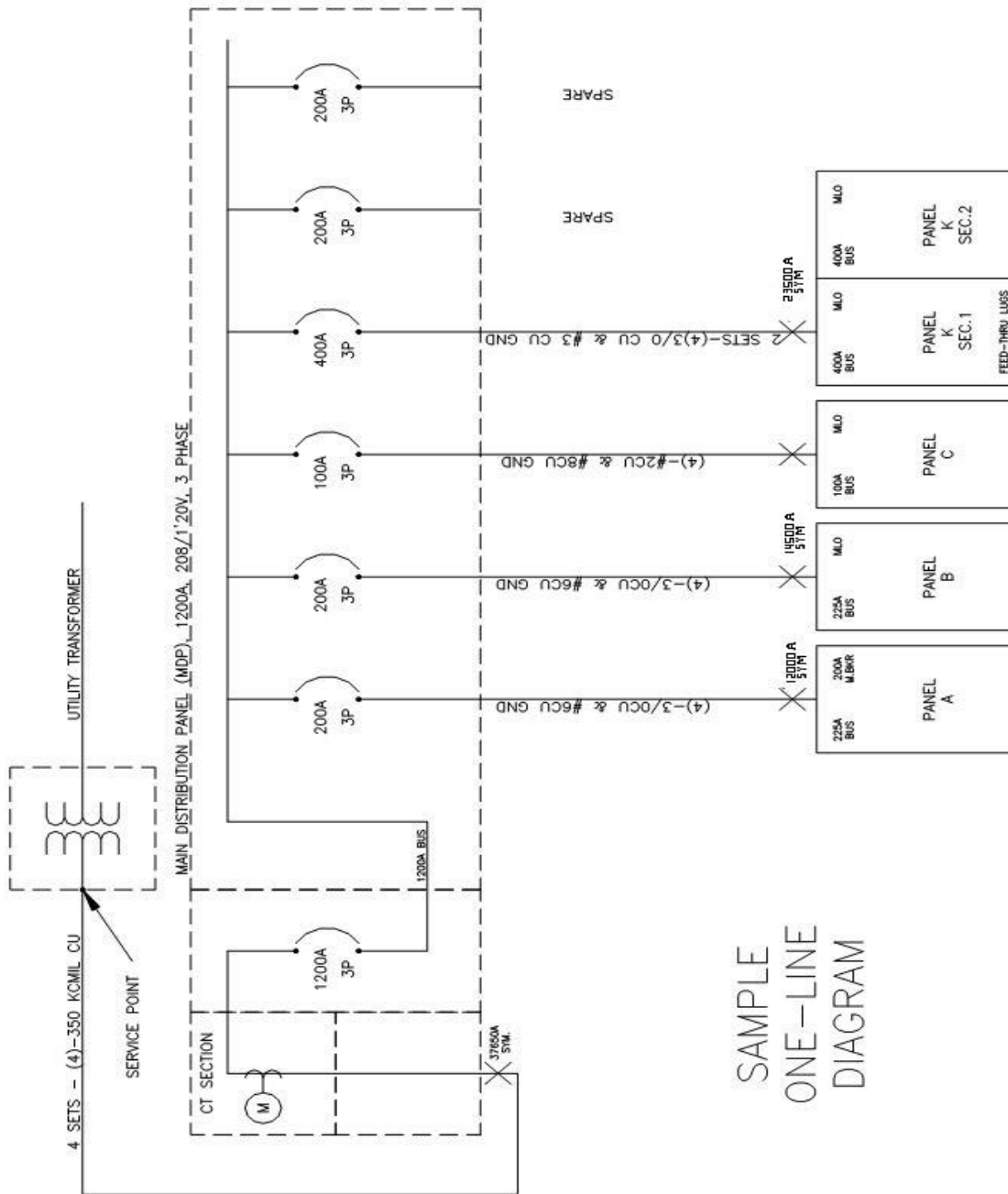
Hazardous Locations (classified)

The boundary lines for any area classified as Class I, Division 1; Class I, Division 2; Class I, Zone 0; Class I, Zone 1; Class I, Zone 2; Class II, Division 1; Class II, Division 2; Class III, Division 1; Class III, Division 2; or any combination thereof shall be clearly indicated on the floor plan sheets and indicate the Classification of this area.

Please use the links below to access the forms:

[Electrical Plan Review - Check List](#)

[Electrical Plan Review – Submittal Form](#)



SAMPLE
ONE-LINE
DIAGRAM

PANEL LOAD CALCULATION WORKSHEET

Project: _____ Date ____/____/____

Panel ID: _____

LOAD TYPE	CONNECTED LOAD	NEC ADJUSTMENT FACTOR	CALCULATED NEC LOAD
Lighting	_____	X 125%	= _____
General-use Receptacles (First 10KVA)	_____	X 100%	= _____
General-use Receptacles (Over 10KVA)	_____	X 50%	= _____
Motors and Compressors	_____	X 100%	= _____
(Largest Motor Load) (_____)		X 25%	= _____
Dedicated or Specific-use Receptacles	_____	X 100%	= _____
HVAC and Mechanical Equipment Loads	_____	X 100%	= _____
Kitchen Equipment (#____)	_____	X ____%	= _____
Miscellaneous Loads	_____	X 100%	= _____
_____	_____	X ____%	= _____
_____	_____	X ____%	= _____
_____	_____	X ____%	= _____
<input type="checkbox"/> 240/120 <input type="checkbox"/> 3Ø <input type="checkbox"/> 208/120 <input type="checkbox"/> 1Ø <input type="checkbox"/> 480/277 <input type="checkbox"/> _____ System Voltage	<div style="border: 1px solid black; width: 250px; height: 40px; margin: 0 auto;"></div> TOTAL CONNECTED LOAD		<div style="border: 1px solid black; width: 220px; height: 40px; margin: 0 auto;"></div> TOTAL CALCULATED LOAD
		<div style="border: 1px solid black; width: 220px; height: 40px; margin: 0 auto;"></div> TOTAL CALCULATED AMPS	

Connected Load-

1. The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit. (Water heaters, space heaters, ranges, refrigerators, etc.)
2. 180 VA for each general-use receptacle.
3. Maximum VA of lighting fixtures.
4. VA of all motors based on full load amps from table 430-247, 248, 249 and 250 of the National Electrical Code.

Calculated NEC Load-

The connected load after any adjustment factors allowed by code, have been applied. Load calculations shall be submitted/expressed in VA and converted to amps when sizing feeders and equipment, and is the minimum size allowed based upon these calculations.

Panel ID: _____ Location: _____ Fed From: _____	PANEL SCHEDULE Single Phase	Bus Rating: _____ A <input type="checkbox"/> Main Breaker _____ A <input type="checkbox"/> Main Lugs Only <input type="checkbox"/> Fed-Thru Lugs <input type="checkbox"/> Double Lugs Single Phase <input type="checkbox"/> 3-wire <input type="checkbox"/> 4-wire <input type="checkbox"/> Iso. GND Voltage <input type="checkbox"/> 240/120 <input type="checkbox"/> 208/120 <input type="checkbox"/> _____
Panel A.I.C. Rating: <input type="checkbox"/> 10 K <input type="checkbox"/> 14 K <input type="checkbox"/> 18 K <input type="checkbox"/> 22 K <input type="checkbox"/> 25 K <input type="checkbox"/> 42 K <input type="checkbox"/> 65 K <input type="checkbox"/> 100 K <input type="checkbox"/> 150 K <input type="checkbox"/> 200 K		

Circuit Description		LOAD(VA)	Code	Breaker	BUS	Breaker	Code	LOAD(VA)	Circuit Description	
1					A					2
3					B					4
5					A					6
7					B					8
9					A					10
11					B					12
13					A					14
15					B					16
17					A					18
19					B					20
21					A					22
23					B					24
25					A					26
27					B					28
29					A					30
31					B					32
33					A					34
35					B					36
37					A					38
39					B					40
41					A					42

Code Description:

L = LIGHTING LOADS

R = GENERAL USE RECEPTACLES

M = TOTAL MOTOR LOAD

S = DEDICATED RECEPTACLES

H = HVAC

K = KITCHEN EQUIPMENT

LM = LARGEST SINGLE MOTOR

Z = MISC OR APPLIANCES

REVISION DATE: 12-26-2019

Panel ID: _____ Location: _____ Fed From: _____	PANEL SCHEDULE Three Phase	Bus Rating: _____ A <input type="checkbox"/> Main Breaker _____ A <input type="checkbox"/> Main Lugs Only <input type="checkbox"/> Fed-Thru Lugs <input type="checkbox"/> Double Lugs Three Phase <input type="checkbox"/> 3-wire <input type="checkbox"/> 4-wire <input type="checkbox"/> Iso. GND Voltage <input type="checkbox"/> 480/277Y <input type="checkbox"/> 208/120Y <input type="checkbox"/> 240/120Δ <input type="checkbox"/> _____
Panel A.I.C. Rating: <input type="checkbox"/> 10 K <input type="checkbox"/> 14 K <input type="checkbox"/> 18 K <input type="checkbox"/> 22 K <input type="checkbox"/> 25 K <input type="checkbox"/> 42 K <input type="checkbox"/> 65 K <input type="checkbox"/> 100 K <input type="checkbox"/> 150 K <input type="checkbox"/> 200 K		

Circuit Description		LOAD(VA)	Code	Breaker	Ø	Breaker	Code	LOAD(VA)	Circuit Description
1					A				2
3					B				4
5					C				6
7					A				8
9					B				10
11					C				12
13					A				14
15					B				16
17					C				18
19					A				20
21					B				22
23					C				24
25					A				26
27					B				28
29					C				30
31					A				32
33					B				34
35					C				36
37					A				38
39					B				40
41					C				42

Code Description:

L = LIGHTING LOADS
R = GENERAL USE RECEPTACLES

M = TOTAL MOTOR LOAD
S = DEDICATED RECEPTACLES

H = HVAC
K = KITCHEN EQUIPMENT

LM = LARGEST SINGLE MOTOR
Z = MISC. OR APPLIANCES

REVISION DATE: 12-26-2019

DISTRIBUTION CALCULATION WORKSHEET

Date: _____

Name: _____

Address: _____

Inspection Office: _____

Project Description: _____

LOAD TYPE												CONN. TOTAL	%	CALC. TOTAL
Lighting Loads													x125%	
General use Receptacles≤10 KVA													x100%	
General use Receptacles>10 KVA													x50%	
Motors and Compressors													x100%	
(Largest Motor)	()	()	()	()	()	()	()	()	()	()	()		x25%	
Specific-use Receptacles													x100%	
HVAC Equipment and Mechanical													x100%	
Kitchen Equipment													x____%	
Miscellaneous or Appliances													x100%	
													x____%	
													x____%	
CONNECTED LOAD														
CALCULATED LOAD														
AMPS														

PEAK DEMAND CALCULATION WORKSHEET

PER NEC 220-87 and WAC 296-46B-900(3)(j)

1.	Recorded Peak Demand on Date: _/_/_/ _/_/ _/_	=	_____	KW
	Study Dates: From _/_/ _/_/ _/_			
	To _/_/ _/_/ _/_			
2.	Power Factor	÷	_____	(P.F.)
	Apparent Peak Demand	=	_____	KVA
3.	NEC 220-87 adjustment factor	X	1.25	
	Adjusted Peak Demand		_____	KVA
4.	Seasonal adjustment factor * & **	X	_____	
	Seasonally Adjusted Peak Demand	=	_____	KVA
5.	Occupancy adjustment factor **	X	_____	
	Occupancy Adjusted Peak Demand	=	_____	KVA
6.	Other adjustment factor(s) **	X	_____	
	Total Peak Demand	=	_____	KVA
7.	New Calculated Load Added	+	_____	KVA
Metered demand based CALCULATED LOAD:				KVA
				AMPS

Note: See WAC 296-46B-900(3)(j) for additional metering requirements.

* Based upon 12 month utility data, or explain why not.

** Explain how the factor was derived for 30-day demand metering or explain why it doesn't apply.

Seasonal _____

Occupancy _____

Other _____

APPROVED PLANS

WAC 296-46B-900 (3)(d)(v) requires that “approved” plans shall be available on the job site for use by the electrical inspector as soon as they are approved, and prior to the final inspection. The following illustrations represent the appearance of the approval stamps currently in use by the Labor and Industries Electrical Plans Examiners.

The large stamp below will be placed on the cover sheet of the complete plan package, on the first sheet of the electrical plans, or on both. The name of the electrical plans examiner will be on the approval stamp.

- ☐ APPROVED-Means that the plans have been approved as submitted without corrections.
- ☐ APPROVED **AS NOTED**-Means that the plans have been approved and the plans examiner has included notes, intended for the electrical inspector that describe corrections or changes in the original design submittal. These notes are always written or highlighted in RED INK and individually initialed by the plans examiner. Compliance with these notes is mandatory and a condition of the plan approval.

Washington State Department of
Labor & Industries

Electrical Plan Review

☐ APPROVED ☒ APPROVED AS NOTED

DATE 10/10/2018 EPR# 110-01-1801

BY Joe Evankovich

SUBJECT TO PERMIT FEE \$305.00
PROJECT SUBJECT TO CODE AND
FIELD INSPECTION

SHEET 1 OF 8 SHEETS

The small stamp below will be placed on each additional approved electrical plan sheet. The name of the electrical plans examiner will be on each approval stamp.

10/10/2018
EPR# 110-01-1801

Washington State Department of
Labor & Industries

Subject to code and field inspection
APPROVED BY:
Joe Evankovich